

Specification 5100-256b
August 1997
Superseding
Specification 5100-256a
February 1980

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SPECIFICATION FOR
PUMP, FIRE, BACKPACK, HAND-OPERATED

1. SCOPE.

1.1. Scope. The hand-operated trombone pump described in this specification is used with a fabric backpack bag or metal backpack tank in wildland firefighting activities. The pump is a lightweight slide-action type. The trombone pump includes a hose with a quick-connect coupling; a dual nozzle tip or adjustable nozzle tip providing either a straight stream or spray flow pattern; and a D-ring on the outside surface of the pump, providing a point of attachment to a backpack strap harness.

2. APPLICABLE DOCUMENTS.

2.1. Government Documents. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those in effect on the date of the invitation for bids or request for proposals (see 6.2).

USDA Forest Service Specifications

5100 -90 - Water Bag, 1 and 5 Gallon, Nylon Duck (With Replaceable Liner)

5100-257 - Tank, Metal, Fire, Backpack

Federal Specification

ZZ-H-601 - Hose and Hose Assemblies, Rubber (Wrapped or Braided) Water Service

Copies of federal specifications are available from General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 200, 470 East L'Enfant Plaza SW, Washington DC 20407.

Copies of USDA Forest Service Specifications and Standards are available from USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

Beneficial comments, recommendations, additions, deletions and any pertinent data that may be used in improving this document should be addressed to: USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198 by using the Specification Comment Sheet at the end of this document or by letter.

2.2. Non-Government Publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals.

American National Standards Institute (ANSI) / American Society for Quality Control (ASQC)

Z 1.4 - Sampling Procedures and Tables for Inspection by Attributes

Address requests for copies to the American National Standards Institute Inc., 11 West 42nd Street, New York, NY 10036.

American Society for Testing and Materials (ASTM)

A 165 - Electro-deposited Coatings of Cadmium on Steel

E 380 - Practice for Use of the International System of Units

Address requests for copies to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

2.3. Order of Precedence. In the event of conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS.

3.1. Qualified Products List Number. The bidder shall possess a currently valid notice of qualification with associated Qualified Products List (QPL) number obtained in accordance with 4.1. The date of issue on the QPL number shall precede the date on the invitation for bids. The pump shall be qualified as single action or double action.

3.2. Construction.

3.2.1. Trombone Pump. The pump shall be hand operated, slide-action type with one tube sliding within another. The slide action produces positive pressure either in the pull direction only for single action or in both push and pull directions for double action. The pump shall be a single action, unless otherwise specified. The inlet end shall be fitted with a hose barb connection for a 3/8-inch (9.5 mm) inside diameter hose. The hose barb waterway shall be minimum 0.25 inch (6.35 mm) inner diameter. The outlet end of the pump shall be 1/4-inch 18 NPSM free-fitting American Standard straight pipe external threads and shall fit the nozzle described in 3.2.6. The pump shall include a lock feature, hand grip, D-ring, hose, nozzle tip, and quick-connect coupling. The pump shall be easily assembled and disassembled without special tools.

3.2.2. Lock Feature. The pump shall be provided with a lock or drag feature to prevent extension by gravity. This feature shall not restrict or hamper operation of the pump in any way.

3.2.3. Hand Grip. Hand grip areas shall be fitted into the forward and rear sections of the pump. One or both of the hand grips may be pistol grips. The grip areas shall be shaped and positioned for utmost safety and comfort in pumping operation.

3.2.4. D-Ring. A 0.5 inch (12.7 mm) to 1.5 inch (38.1 mm) inside radius D-ring shall be permanently attached to the outer pump cylinder, so that the midpoint of the straight part of the D-ring is 11 inches, +/- 1 inch (279.4 mm, +/- 25.4 mm) from the end of the pump cylinder with the hose barb connection, as measured when the cylinder is assembled. The straight section of the D-ring shall be positioned to be parallel to the centerline axis of the pump cylinder. The D-ring shall provide for a point of attachment for the pump attachment clip described in USDA Forest Service Specification 5100-257.

3.2.5. Hose. A hose shall be securely fastened onto the pump inlet hose barb. If a clamp is used, it shall be free of any protrusions or sharp edges that could cause discomfort or injury to the operator. The hose shall be 3/8-inch (9.5 mm) inside diameter and shall be 4.0 foot \pm 1 inch (1.22 m \pm 25.4 mm) long.

3.2.6. Nozzle Tip. The nozzle shall be a dual nozzle tip or adjustable single nozzle tip. The nozzle shall generate a straight stream pattern in accordance with 3.8.8, and a spray pattern in accordance with 3.8.9. The nozzle shall attach to the pump discharge end by at least 4 full internal threads of 1/4-inch 18 NPSM free-fitting American standard straight pipe threads. A gasket shall be installed where required, to prevent leakage. Deflector plates or other external devices to produce a spray shall not be allowed. The nozzle tip shall be removable for cleaning. A bead chain may be provided as a component part of the pump, permanently connecting the nozzle tip to the pump, in order to prevent loss of the tip. Tip changeover shall not require any tools. With an adjustable nozzle, water pattern change shall be accomplished without the use of special tools.

3.2.7. Quick-Connect Coupler. A 90 degree nipple section of an external threaded quick-connect coupling with 3/8-inch (9.53 mm) diameter hose barb connection shall be provided on the hose inlet. This coupling shall mate with the internal threaded coupler section of the quick-connect coupling on the fabric bag described in USDA Forest Service Specification 5100-90, and the metal tank described in USDA Forest Service Specification 5100-257. The nipple section shall have a minimum waterway of 0.25 inch (6.4 mm). The external threaded section of the quick-connect coupling shall be as listed in Table 1, or equivalent and shall be fully interchangeable between products.

Table 1. Quick-Connect Couplings - External Threads

Product	Manufacturer
Amflo Part Number CP5-44-90	Amflo Products, Inc. 1430 S. Anaheim Blvd Anaheim, CA 92805
D.B. Smith Part Number 175875	D.B. Smith and Company 414 Main Street Utica, NY 13501
H.D. Hudson Part Number 144-955	H.D. Hudson Manufacturing Company 1130 17th Street NW, Suite 300 Washington DC 20036
Parker Hannifin Part Number 14 10 Coupler, 3/8-inch 18 NPT	Quick-Coupling Division, Parker-Hannifin 8145 Lewis Road Minneapolis, MN 55427

3.3. Materials. Where more than one type of material is used in various components, there shall be no incompatibility between materials which may cause corrosion.

3.3.1. Pump Body, Tip and Component Material. Pump body material, inner and outer tube sections, nozzle tip, and end material shall be made of bronze, brass, or stainless steel. In addition, pump body and component material shall be corrosion resistant in an air-water atmosphere.

3.3.2. Hand Grip Material. Hand grip material shall be made of the same material as the pump; bronze, brass, stainless steel; or of galvanized steel. In addition, the hand grip shall be coated with an elastomer coating or plastic coating. If the hand grip material is galvanized steel, no coating is required. The elastomer coating or plastic coating shall be resistant to ultraviolet degradation and ozone.

3.3.3. Seal and Gasket Material. All pump seal and gasket material shall be oil and ozone resistant. Seal lubrication shall be of a type that will not dry out or otherwise make the pump unsuitable for use after storage for up to two years.

3.3.4. Hose Material. Hose material shall conform to the requirements of Federal Specification ZZ-H-601, grade 3, or shall consist of a polyvinyl chloride seamless core encased in a flexible nylon braid with a reinforced polyvinyl chloride cover, chemically inert, resistant to solvents and to abrasion.

3.3.5. Hose Fitting and Quick Connect Material. Hose fitting and external threaded quick-connect coupling nipple section material shall be bronze, cadmium or zinc-plated steel, or stainless steel and shall be non-corrosive in an air-water atmosphere. Cadmium plating shall be type OS in accordance with ASTM A 165.

3.3.6. Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR), provided all performance requirements of this specification are met.

3.4. Dimensions and Weights.

3.4.1. Dimensions. The overall length of the pump in the contracted position, including nozzle tip, shall not be more than 20 inches (508 mm). The outside cylinder shall be between 0.87 inch (22 mm) and 1.25 inches (32 mm) in diameter.

3.4.2. Weights. The dry weight of the pump with the nozzle but without the hose shall not be more than 2 pounds 8 ounces (1.13 kg). The 4.0 foot (1.22 m) length of hose shall not weigh more than 12 ounces (340 g). The nozzle tip assembly shall not weigh more than 3 ounces (85 g).

3.4.3. Dimensional Tolerance. Unless otherwise noted, the following tolerances apply: one place (x.x) ± 0.1 inch (2.5 mm); two places (x.xx) ± 0.01 inch (0.25 mm) and three places (x.xxx) ± 0.010 inch (0.254 mm).

3.5. Workmanship. Workmanship shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any defect which may impair serviceability or detract from the product's appearance.

3.5.1. Symmetry. All metal part sections shall be symmetrical and concentric to 0.030 inch (0.762 mm).

3.5.2. Extruded and Forged Components. Extruded and forged sections shall be free from laps, sharp die marks, cracks and other defects.

3.5.3. Cast Components. Cast parts shall be fine-grained, free from blowholes, pinholes, pits, porosity, hard spots, shrinkage, cracks or other defects.

3.6. Marking. The outer tube section of the pump body shall be permanently and legibly marked, on the outside surface, with the manufacturer's name or trademark, nozzle thread of 1/4-inch 18 NPSM and the letters "FSS". The minimum letter height shall be 0.12 inch (3.05 mm).

3.7. Surface Finish. The finish shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any finish defect which may impair serviceability or detract from the appearance of the item.

3.7.1. Cast Surface Finish. Exterior surfaces shall be smooth and cleaned by sandblasting, tumbling, or other accepted standard commercial process.

3.7.2. Forged and Extruded Surface Finish. Die-formed and machined surfaces, except threads, shall be smooth and have a roughness of not more than 125 min (3.2 mm).

3.7.3. Plastic Coating Surface Finish. Excessive material on edges shall not be allowed. All surfaces shall be free from laps, sharp die marks, cracks, flash, burrs, and sharp edges. The surface of the finished product shall be smooth and tack free.

3.8. Performance.

3.8.1. Lock Feature Resistance Testing. When tested in accordance with 4.7.2, the lock or drag feature of the pump shall prevent extension by gravity with 3 pound \pm 1 ounce (1.36 kg \pm 28 g) weight attached and with the pump in the fully contracted position.

3.8.2. D-Ring Tension Test. When tested in accordance with 4.7.3, the D-ring attached to the pump shall withstand a 50 pound (22.7 kg) tension force with no permanent deformation, mechanical damage or structural failure.

3.8.3. Hose Pressure Test. When tested in accordance with 4.7.4, the hose shall withstand 25 psig (172 kPag) hydrostatic pressure with no leaks, permanent deformation, mechanical damage or structural failure.

3.8.4. Hose Vacuum Test. When tested in accordance with 4.7.5, the hose shall withstand 26 inches Hg (88 kPa) vacuum, without collapsing or structural failure.

3.8.5. Hose Kink Test. When tested in accordance with 4.7.6, the hose shall not kink when coiled with a diameter of 5.0 \pm 0.5 inches (127 \pm 12 mm).

3.8.6. Hose Connection Tension Test. When tested in accordance with 4.7.7, the hose shall not part from the barb, when a tension force of 50 pounds \pm 1 pound (22.7 \pm 0.45 kg) is applied.

3.8.7. Bead Chain Tension Test. If a bead chain is attached, when tested in accordance with 4.7.8, the bead chain shall withstand a tension force of 30 pounds (13.6 kg) between the pump and nozzle tip.

3.8.8. Nozzle Tip Straight Stream Tests. When tested in accordance with 4.7.9, the nozzle tip shall project a solid stream of water vertically to a height of 17.0 foot \pm 6 inches (5.18 m \pm 152 mm) above the nozzle tip. The dispersal shall not exceed 2.0 feet (610 mm) in diameter. The nozzle flow rate shall be greater than 0.75 gpm (2.84 Lpm) and less than 1.25 gpm (4.73 Lpm).

3.8.9. Nozzle Tip Spray Tests. When tested in accordance with 4.7.10, the nozzle tip shall produce an evenly distributed 30 degree spray pattern. The nozzle flow rate shall be greater than 0.75 gpm (2.84 Lpm) and less than 1.25 gpm (4.73 Lpm).

3.8.10. Pump Side Load Support. When tested in accordance with 4.7.11, the pump shall support a side load of 55 pound (25 kg) with no permanent deformation, mechanical damage or structural failure.

3.8.11. Anti-Siphoning Action. When tested in accordance with 4.7.12, the anti-siphoning mechanism of the pump shall prevent any discharge or leakage at the nozzle tip.

3.8.12. Pump Priming. When tested in accordance with 4.7.13, the pump shall be able to prime within five pumping cycles at a 4.0 foot (1.22 m) draft height.

3.8.13. Flow Rate and Pumping Force. When tested in accordance with 4.7.14, the pump without nozzle tip, shall deliver a minimum of 0.75 gpm (2.84 Lpm) of water, with pumping force not to exceed 35 pounds (15.9 kg).

3.8.14. Static Pumping Force. When tested in accordance with, 4.7.15, the pump shall withstand a static pumping force of 100 pounds (45.4 kg) for 5 seconds with no permanent deformation, mechanical damage or structural failure.

3.8.15. Maximum Pumping Rate. When tested in accordance with 4.7.16, the pump flow rate curve shall be linear to 45 degrees when plotted on the flow versus cycles chart.

3.8.16. Pumping Endurance. When tested in accordance with 4.7.17, the pump shall produce at least 0.75 gpm (2.84 Lpm) of water with a pumping force not to exceed 35 pounds (15.9 kg), without leaking, any permanent deformation, mechanical damage or structural failure, after completing 50,000 cycles of pumping operation.

3.8.17. Post Endurance. When tested in accordance with 4.7.18, at the end of 50,000 cycles, the pump shall be re-tested for flow rate and pumping force according to 4.7.14, to determine if performance has been reduced. The pump without nozzle tip, shall deliver a minimum of 0.75 gpm (2.84 Lpm) of water, with pumping force not to exceed 35 pounds (15.9 kg).

3.9. Metric Products. Metric dimensions are provided for information only, inch-pound units shall be the required units of measure for this specification. Thread series designation is indicated as 1/4-inch 18 NPSM. Since this is thread series designation, not an indication of a specific dimension, the metric equivalent is not given. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pounds units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of ASTM E 380, and all other requirements of this standard are met.

4. SAMPLING, INSPECTION AND TEST PROCEDURES.

4.1. Qualification Testing.

4.1.1. Manufacturer Submission for Qualification Tests. The prospective contractor shall provide, without cost to the Government:

- a. Five complete sets or one reproducible set of detailed dimensional drawings and specifications.
- b. One sample pump with operating and maintenance instructions.
- c. Certificates of conformance. See 4.6.
- d. The estimated test fee. Contact the Water Handling Project Leader at the USDA Forest Service, San Dimas Technology and Development Center (SDTDC), 444 East Bonita Avenue, San Dimas, CA 91773.
- e. A signed collection agreement. Contact the SDTDC Water Handling Project Leader for a copy of the form.
- f. All of the above items shall be delivered to SDTDC to the attention of the Water Handling Project Leader.

The Government shall not be responsible for the submitted test samples.

4.1.2. Qualification Test. Qualification inspection and tests shall be conducted by the Government and at the expense of the contractor at a fee to be determined by the Government. If requested by the contractor, the Government will inform the contractor of date and place of inspection and tests. The contractor may send a representative (who has been designated in writing) to be present and observe the inspection and tests, but he/she will not be permitted to be a participant. Upon completion of tests, the test sample will be retained by the Government. Qualification testing shall stop on a single failure and the test sample rejected. The contractor will be informed as to the nature of the failure. The Government shall not be obligated to continue testing a defective item once it is known to be defective or when it is considered to be in the best interest of the Government.

4.1.3. Notice of Qualification. Notice of Qualification shall be issued to the contractor upon the successful completion of qualification tests. Copies of qualification notices shall be provided to the General Services Administration. A copy shall be retained in the SDTDC file.

4.1.4. Notice of Failure to Qualify. The contractor shall be notified by letter of a failure to qualify, if the submitted pump unit does not meet the requirements of this specification.

4.1.5. Re-qualification. After qualification, if any changes are made to the product or where it is manufactured, the contractor shall notify SDTDC immediately in writing. The need for requalification shall be determined by the Government when there are changes to the product or this specification.

4.2. General Inspection and Tests. Unless otherwise specified in the contract or purchase order, the contractor is responsible for performance of all inspection requirements prior to submission for Government acceptance inspection and tests. The contractor may utilize their own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government.

4.2.1. Inspection and Test Sites. The Government shall conduct lot acceptance inspection and tests to determine compliance with the specification. If lot acceptance and tests are conducted at locations other than the manufacturing facilities, the contracting officer will specify location and arrangements. In the case of on-site inspections at the contractor's facility, the contractor shall furnish the inspector all reasonable facilities for their work. During any inspection, the inspector may take from the lot one or more samples and submit them to an independent test laboratory approved by the Government or to a Government test facility for inspection and tests.

4.2.2. Testing With Referenced Documents. The contractor is responsible for ensuring that components and materials used were manufactured, examined and tested in accordance with referenced specifications and standards. The Government reserves the right to perform any of the inspections or tests set forth in this section where such action is deemed necessary to assure supplies and services conform to prescribed requirements. All inspection or testing of a sample shall stop upon a single failure and the sample rejected. The contractor will be informed as to the nature of the failure. The Government shall not be obligated to continue testing a defective item once it is known to be defective or when it is considered to be in the best interest of the Government.

4.3. Responsibility for Compliance. All items shall meet all requirements of sections 3 and 4. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.4. Sampling for Inspection. When inspection is performed, sampling shall be in accordance with ANSI/ASQC Z 1.4.

4.4.1. Lot. All pumps of the same type, presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one pump.

4.4.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-2, with an Acceptable Quality Level (AQL) of 2.5 percent defective.

4.4.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-2 with an AQL of 1.5 percent defective.

4.5. Inspection and Tests.

4.5.1. Visual and Dimensional Examination. When selected in accordance with 4.4.2, each sample pump unit shall be visually and dimensionally examined to determine conformance with this specification. Visual or dimensional defects shall be classified as major or minor. A defect not listed in Table 2 shall be classified as a minor defect. If the number of defects in any sample exceeds the indicated AQL, the lot shall be rejected.

Table 2. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Backpack trombone pump not complete.	X	
2. Construction or materials not as required.	X	
3. Dimensions and weights not as required.	X	
4. Quick-connect couplings not as required.	X	
5. Markings not as required.		X
6. Workmanship not as required.		X

4.5.2. Lot Acceptance Tests. Each of the samples selected in accordance with 4.4.3, shall be tested in accordance with 4.7, to determine conformance with requirements of this specification.

4.5.3. Quality Conformance Inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z 1.4. The inspection level and AQL shall be as specified in 4.4.3.

4.5.4. Rejected Lots. Rejected lots may be offered again for inspection provided the contractor has removed all non-conforming pumps. The inspector shall again select, inspect, and test samples from such resubmitted lots to determine conformance with this specification.

4.6. Certificates of Conformance. Where certificates of conformance are required, the Government reserves the right to verify test any such items to determine the validity of certification. These certificates shall be based on the testing of component materials and may be performed by the component material supplier. The contractor shall provide certificates of conformance for all materials used in 3.2.7, 3.3.1, 3.3.2, 3.3.4 and 3.3.5 (see 4.6.4, 4.6.5, 4.6.6, 4.6.7, 4.6.8 and 4.6.9).

4.6.1. Certification. The contractor shall provide certificates of conformance for all materials used in the manufacture of an item. The contractor shall provide the following information on certificates of conformance:

- a. Material description, i.e. Aluminum 6061, T6; rubber sheet material for gaskets
- b. Specification, Standard or Test Method (include type, class, and form when applicable)
i.e. ASTM D2240, ASTM D412, or MIL-A-8625, Type III, Class 1
- c. Lot or batch number
- d. Test company name, address, and telephone number
- e. Test technician/Quality Assurance Manager's name and title
- f. Test date

4.6.2. Test Results. The contractor shall maintain complete records, including test results. At the request of the government, the contractor shall provide test results and other records, as described in the certificates of conformance, for all materials used in the manufacture of an item.

4.6.3. Certificates of Conformance in Lieu of Testing. Unless otherwise specified, certificates of conformance may be acceptable in lieu of testing end items.

4.6.4. Quick Connect Coupler. As required by 3.2.7, the quick connect coupler shall meet the indicated product model number in Table 1 or meet the indicated material physical property requirements listed.

4.6.5. Pump Body and Component Material. As required by 3.3.1, the pump body material, inner and outer tube sections, nozzle tip, and end material shall meet the indicated material physical property requirement listed.

4.6.6. Hand Grip Material and Coating. As required by 3.3.2, the hand grip material shall be made of bronze, brass, stainless steel or galvanized steel. In addition, the hand grip shall meet the indicated material physical property requirement listed. The hand grip coating shall meet the indicated material physical property requirements listed.

4.6.7. Hose Material. As required by 3.3.4, the hose material shall meet the indicated material physical property requirement listed, when tested to the defined test method.

4.6.8. Hose Fitting and Quick Connect Coupler Material. As required by 3.3.5, the hose fitting and quick connect coupler material shall meet the indicated material physical property requirements listed.

4.6.9. Cadmium Plating. As required by 3.3.5, if cadmium plating is required, the plating shall meet the indicated material physical property requirement listed, when tested to the defined test method.

4.7. Performance Testing. Samples shall be subjected to the following tests to determine if the samples meet the requirements of the specification. The pump with nozzle tip and the hose shall be measured and weighed before performance testing.

4.7.1. Fluid Medium. All testing requiring the use of a fluid medium shall be performed using municipally supplied potable water; this shall include, but is not limited to pump performance testing. If the contractor does not have access to a municipal water supply, the testing shall be performed using any clear fresh water normally available for firefighting. Testing performed by the Government will be conducted using municipally supplied potable water.

4.7.2. Lock Feature Resistance Test. As required by 3.8.1, the pump shall be tested for lock or drag feature resistance. With a 3 pound \pm 1 ounce (1.36 kg \pm 28 g) weight attached to the nozzle tip end of the pump, and the pump fully contracted and held pointing perpendicular to the test room floor, the pump shall be raised until the weight hangs freely. The pump shall be observed to determine if the lock or drag feature keeps the pump in its contracted position.

4.7.3. D-Ring Tension Test. As required by 3.8.2, the D-ring attachment shall be tested for tension strength. Tension strength testing shall be conducted using a tension machine or by the dead weight test method. With the straight section of the D-ring attached to the pump, a tension force of 50 pounds (22.7 kg) shall be applied to the D-ring, with the pulling direction perpendicular to the pump axis (in a direction away from the pump). If a tension machine is used, the tension force shall be applied at a rate not to exceed 0.2 inch (5.08 mm) per minute. Separation of the D-ring from the pump, or any sign of damage to the attachments or the D-ring, shall fail the sample.

4.7.4. Hose Pressure Test. As required by 3.8.3, one end of the hose shall be connected to a water pressure source and the other end capped. Water pressure shall be increased up to 25 psig (172 kPag) in one minute and the hose examined for deformation, leakage or bursting.

4.7.5. Hose Vacuum Test. As required by 3.8.4, the hose shall be vacuum tested. Connect one end of the hose to a vacuum-pumping source at 26 inches Hg (88 kPa) vacuum. The hose shall be examined for collapse and structural failure. Release the vacuum and repeat examination with no vacuum. There shall be no collapse or structural failure.

4.7.6. Hose Kink Test. As required by 3.8.5, the hose shall be coiled with a diameter of 5.0 ± 1 inches (127 ± 25 mm). The hose shall be visually examined for any kinks.

4.7.7. Hose Connection Tension Test. As required by 3.8.6, the hose connection shall be tested for tension strength. Tension strength testing shall be conducted using a tension machine or by the dead weight test method. The hose shall be properly installed on the barbed pump fitting. A tension force of 50 pounds (22.7 kg) shall be applied on the hose, with the pulling direction perpendicular to the pump axis (in a direction away from the pump). If a tension machine is used, the tension force shall be applied at a rate not to exceed 0.2 inch (5.1 mm) per minute. Separation of the hose from the pump, or movement more than 0.25 inch (6.4 mm) or more, or any sign of damage to the attachments or the hose, shall fail the sample.

4.7.8. Bead Chain Tension Test. As required by 3.8.7, if a bead chain is included in the test sample, the bead chain and points of attachment shall be tested for tension strength. Tension strength testing shall be conducted by using a tension machine or by the dead weight test method. With one end of the bead chain attached to the pump, a tension force of 30 pounds (13.6 kg) shall be applied to the nozzle tip with the pulling direction perpendicular to the pump axis (in a direction away from the pump). If a tension machine is used, the tension force shall be applied at a rate not to exceed 0.2 inch (5.1 mm) per minute. Separation, or any sign of damage to the attachments or the chain, shall fail the sample.

4.7.9. Nozzle Tip Straight Stream Testing. As required by 3.8.8, the nozzle tip shall be tested for straight stream performance. The nozzle tip shall be connected to a water pressure source including a flow meter. The nozzle tip shall be mounted on a fixture with the discharge end pointing vertically upward from the test room floor. Pressure of 35 ± 1 psig (241 ± 7 kPag) shall be applied. The height of the water jet and the dispersal diameter shall be measured at the extreme points.

4.7.9.1. Flow Rate Test. Measure the flow rate using a calibrated flow meter device or the weight versus time method. The nozzle tip connection, to include gasket, shall not leak during performance testing.

4.7.10. Nozzle Tip Spray Testing. As required by 3.8.9, the nozzle tip shall be tested for spray performance. The nozzle tip shall be connected to a water pressure source. Mount on a fixture with the discharge end pointing horizontally with the ground or test room floor. A pressure of 35 ± 1 psig (241 ± 7 kPag) shall be applied. The angle of the spray pattern shall be measured.

4.7.10.1. Flow Rate Test. Measure the flow rate using a calibrated flow meter device or the weight versus time method. The nozzle tip connection, to include gasket, shall not leak during performance testing.

4.7.11. Pump Side Load Support Test. As required by 3.8.10, the pump shall be tested for side load support. Testing shall be conducted using a tension machine or by the dead weight test method. The pump shall be fully extended and mounted on a compression testing machine with supports at 16 ± 0.25 inches (406 ± 6.4 mm), center to center spacing, and with the pump centrally located. A compression load shall be applied on the pump at the midpoint between the supports. If a tension machine is used, the rate for applying the load shall be not more than 0.2 inch (5.1 mm) per minute, up to 55 ± 1.0 lb (24.9 ± 0.45 kg). The pump support shall be 1 inch (25.40 mm) wide and the upper compression force bar shall be 0.25 inch (6.4 mm) wide.

4.7.12. Anti-Siphoning Action Test. As required by 3.8.11, the pump shall be connected to a fabric backpack bag, as specified in USDA Forest Service Specification 5100-90. Fill the fabric backpack bag with water, prime the pump, contract the pump and lock into place. The fabric bag shall be positioned at a height to produce 3.0 ± 0.2 psig (20.7 ± 1.38 kPag) water pressure at the pump inlet with the pump directly below the fabric bag. The pump shall be manually rotated in various positions to determine if any leakage occurs at the nozzle tip.

4.7.13. Priming Test. As required by 3.8.12, the pump shall be connected to the water filled fabric bag as in 4.7.12, except that the connecting point of the hose to the fabric bag shall be positioned 4.0 foot (1.22 m) below the connecting point of the hose to the pump. With the pump positioned horizontally, pumping action shall be started manually until the pump is primed and discharging water. The number of pumping cycles shall be counted.

4.7.14. Flow Rate and Pumping Force Test. As required by 3.8.13, the pump shall be connected to a fabric bag, as in 4.7.12 and mounted on the backpack pump test machine as shown in Figure 1. Pumping action shall be adjusted to 90 percent +/- 2 percent of full stroke and the machine speed set to produce 30 cycles per minute pumping action at peak discharge pressure of 35 psig (241 kPag) by throttling the test machine discharge valve. After completing adjustments, the flow rate and the pumping force shall be measured.

4.7.15. Static Pumping Force. As required by 3.8.14, after completing the flow rate and pumping force test as described in 4.7.14, the pump and testing apparatus shall remain connected and the pump positioned at its 90 +/- 2 percent extended length. A force gage shall be placed at the rear of the pump, the test machine discharge valve closed, and a 100 pound (45.4 kg) force shall be applied manually and held for 5 seconds. Repeat 4.7.14.

4.7.16. Maximum Pumping Rate Test. As required by 3.8.15, the pump shall be tested for maximum pumping rate. The machine speed shall be adjusted to the lowest speed possible (30 cycles/min) and the pump peak discharge pressure set at 35 +/- 2 psig (241 kPag). The discharge end shall be diverted to a weigh tank and the flow rate calculated for a 1 minute increment. The machine speed will be increased by 5 cycles per minute, up to 70 cycles per minute at 35 ± 2 psig (241 ± 14 kPag) pressure, with flow recorded at each cycle change. The cycles and flow data shall be plotted to determine linearity at 45 degrees.

4.7.17. Pumping Endurance. As required by 3.8.16, after the maximum pumping rate test, the pump shall be lubricated, adjusted and then tested for pumping endurance. The test machine speed shall be adjusted to 30 cycles/min and peak pump discharge pressure at 20 psig (138 kPag). The pump shall be run for 50,000 cycles. Minor adjustments shall be allowed and the pump shall be run for periods of 7 hours a day until completion.

4.7.18. Post Endurance Pump Test. As required by 3.8.17, at the end of 50,000 cycles, the pump shall be re-tested for flow rate and pumping force according to 4.7.14, to determine if performance has been reduced.

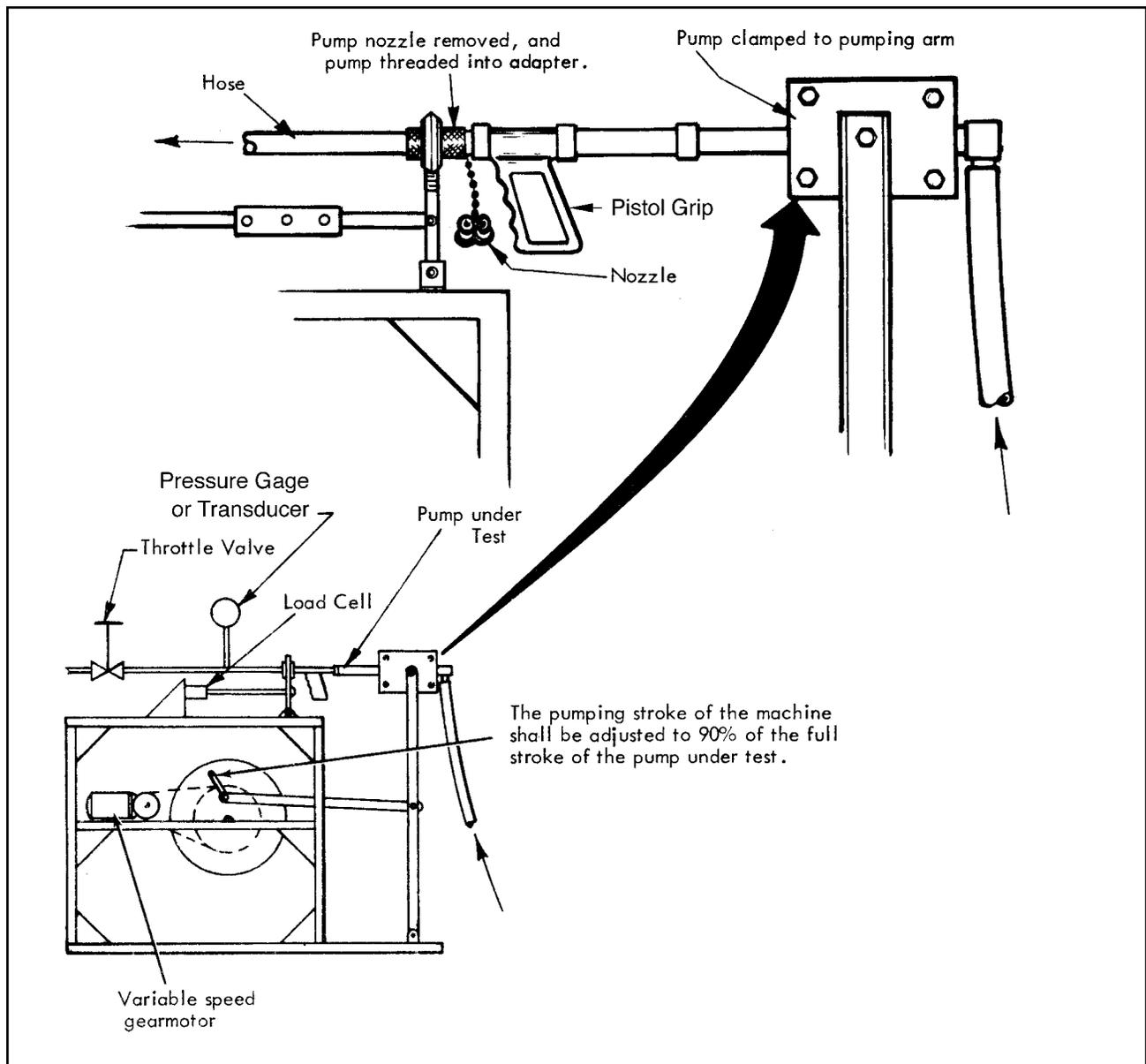


Figure 1. Backpack Pump Endurance Test Apparatus.

5. PACKAGING, PACKING AND MARKING.

5.1. Packaging, Packing and Marking. The pump shall be supplied completely assembled - pump, nozzle, hose and 90 degree nipple shall all be connected together so that no further assembly is necessary for use. Packaging shall not kink the hose. Additional requirements regarding packaging, packing and marking shall be as specified in the contract or order.

6. NOTES.

6.1. Intended Use. The hand-operated trombone pump described in this specification is used with a fabric backpack bag or metal backpack tank in wildland firefighting activities. The pump is a lightweight slide-action type. The trombone pump includes a hose with a quick-connect coupling; a dual nozzle tip or adjustable nozzle tip providing either a straight stream or spray flow pattern; and a D-ring on the outside surface of the pump, providing a point of attachment to a backpack strap harness.

6.2. Acquisition Requirements. Acquisition documents, such as Invitation For Bids and Request For Proposals should specify the following:

- a. Title, number and date of this specification.
- b. If double action pump required (see 3.2.1)
- c. If adjustable nozzle tip is required
- d. If certificates of conformance are acceptable in lieu of lot by lot testing (see 4.6).
- e. Packaging, packing and marking (see 5.1).
- f. Date of the invitation for bids or request for proposals (see 2.1).

6.3. Qualification. The contracting officer should verify that the bidder possesses a currently valid notice of qualification with associated Qualified Products List (QPL) number obtained in accordance with 4.1. This QPL shall have already been obtained with a date of issue prior to the date of invitation for bids.

6.4. Notice. When Government drawings, documents, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever.

6.5. Preparing Activity. USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

**United States Department of Agriculture, Forest Service
Standardization Document Improvement Proposal**

Instructions: This form is provided to solicit beneficial comments which may improve this document and enhance its use. Contractors, government activities, manufacturers, vendors, or other prospective users of this document are invited to submit comments to the USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773-3198. Attach any pertinent data which may be used in improving this document. If there is additional documentation, attach it to the form and place both in an envelope addressed to the preparing activity. A response will be provided when a name and address are included.

Note: This form shall not be used to submit request for waivers, deviation, or for clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

Standard Number and Title: **Specification 5100-256b, Pump, Fire, Backpack,
Hand-Operated.**

Name of Organization and Address:

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444 East Bonita Avenue
San Dimas, California 91773-3198

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